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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/664,435	09/18/2000	Takashi Iwade	H9876.0055/P055	4783

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EXAMINER

YANG, RYAN R

ART UNIT	PAPER NUMBER
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2672

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/664,435

Applicant(s)

IWADE ET AL.

Examiner

Ryan R Yang

Art Unit

2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/1/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6,7,9-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,7 and 9-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to communications: Request for Reconsideration, filed on 3/1/2004. This action is non-final.

2. Claims 1, 3-4, 6-7 and 9-12 are pending in this application. Claims 1, 3-4, 6-7 and 9 are independent claims.

This application claims foreign priority dated 9/16/1999.

3. The present title of the invention is "Method of forming polygon image and image processing apparatus using the same" as filed originally.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 4 and 7 are rejected under 35 U.S.C. 103(e) as being unpatentable over Kawasaki (6,246,414) and furthering in view of Sutherland (3,889,107).

As per claim 1, Kawasaki discloses a method of forming a polygon image, comprising the steps of:

obtaining a plurality of polygons having normal line data as apex data and constituting a model (Figure 8 where the apex data is the normal line data at the vertex);

sorting the plurality of polygons into polygons of a first color part and polygons of a second color part along a boundary line between said first and second color parts according to the direction of a light source and normal lines of the plurality of polygons (Figure 2 18 where the Brightness Calculating Section determine the brightness of the

polygon by the angle of the light source and the normal vector, column 6, line 1-2, the polygons are distinguished by those with brightness and those without brightness);

dividing polygons intersecting the boundary line along the boundary line (Figure 5 S34 and Figure 6F);

sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons (Figure 2 18 where the Brightness Calculating Section determine the brightness of the polygon by the angle of the light source and the normal vector after dividing up the polygon, Figure 4 S21); and

pasting up the first mono-color texture on the polygons belonging to the first color part and the second mono-color texture on the polygons belonging to the second color part (Figure 4 S24).

Kawawsaki discloses a method of forming a polygon image by sorting and subdividing. It is noted that Kawasaki does not explicitly disclose "sorting the plurality of polygons into polygons of a first color part and polygons of a second color part along a boundary line between said first and second color parts", however, this is known in the art as taught by Sutherland. Sutherland discloses a method of sorting colors along a boundary line (Figure 2 and "Dissection is then based on the light source being the viewpoint. Instead discarding those polygons which are not visible (from the light source and thus not illustrated) (or parts thereof), the system designates them to be differently colored or shaded", column 16, line 45-49).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Sutherland into Kawasaki because Kawawsaki discloses a method of forming a polygon image by sorting and subdividing and Sutherland discloses the polygons can be subdivided into two colors along a boundary line in order to efficiently polygons into colors.

6. As per claim 4, since Kawasaki and Sutherlnad's systems are image processing apparatus, it is obvious that his system can the functions as discloses in claim 1 and, therefore, is similarly rejected as claim 1.

7. As per claim 7, since Kawasaki and Sutherlnad's systems are image processing apparatus with memory, it is obvious that his system has the memory containing the program to perform the functions as discloses in claim 1 and, therefore, is similarly rejected as claim 1.

8. Claims 3, 6 and 9 are rejected under 35 U.S.C. 103(e) as being unpatentable over Kawasaki (6,246,414) in view of Sutherland (3,889,107) and further in view of Cosman (6,525,740).

As per claims 3, 6 and 9, Kawasaki and Sutherland disclose a method, apparatus or a program to forming a polygon image with all the elements contained in claims 1, 4 and 7, respectively, except "the intersectional position of the polygon intersecting a boundary line is acquired from a proportional relation with the inner product of each of two apexes of a boundary-line intersecting side of the polygon intersecting the boundary lines when the inner product value at the intersectional position is 0".

Kawawsaki and Sutherland disclose a method of forming a polygon image by sorting and subdividing a plurality of polygons into two colors. It is noted that Kawasaki does not explicitly disclose "the intersectional position of the polygon intersecting a boundary line is acquired from a proportional relation with the inner product of each of two apexes of a boundary-line intersecting side of the polygon intersecting the boundary lines when the inner product value at the intersectional position is 0", however, this is known in the art as taught by Cosman. Cosman discloses a method of shading calculating in which "the lighting and specular highlight are cut off when the dot product of the surface normal N and the light vector L goes negative (i.e. when the surface 106 faces away from the light 98 as shown in FIG. 15) (column 10, line 21-24). Since the boundary between the lighting and shadow has the dot product going from position to negative, it is inherent that the dot product at the boundary is 0.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Cosman into Kawasaki and Sutherland because Kawasaki and Sutherland disclose a method of forming a polygon image and Cosman discloses the dot product at the boundary line between the lighting and shading is 0 in order to mathmatically establish a boundary.

9. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki and Sutherland as applied to claim 1 above, and further in view of Gelb et al. (6,515,674).

10. As per claims 10-12, Kawasaki and Sutherland demonstrated all the elements as applied to the rejected independent claims 1, 4 and 7, supra, respectively, except

"acquiring inner product values of the direction of a light source and normal line of the divided polygons, wherein the polygons intersecting the boundary line are determined as polygons having different polarities of the acquired inner product values".

Kawawsaki and Sutherland disclose a method of forming a polygon image by sorting and subdividing a plurality of polygons into two colors. It is noted that Kawasaki does not explicitly disclose the step of acquiring inner product values of the direction of a light source and normal line of the divided polygons, wherein the polygons intersecting the boundary line are determined as polygons having different polarities of the acquired inner product values, however, this is known in the art as taught by Gelb et al., hereinafter Gelb. Gelb discloses a method of rendering polygons in which a D parameter is derived to decide if the polygons is facing front or back of the light source ("The third parameter D is typically the result of projecting the user-defined vector onto the vertex normal vectors. For front facing polygons, D will be positive and for back facing polygons, D will be negative", column 6, line 45-48).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Gelb into Kawasaki and Sutherland because Kawasaki and Sutherland disclose a method of forming a polygon image and Gelb discloses the polygon is to be shaded by calculating the inner product of the light vector and the polygon normal in order to determine the orientation of the polygon.

Response to Arguments

11. Applicant's arguments with respect to claims 1, 4, 7 and 10-12 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Inquiries

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Ryan Yang** whose telephone number is **(703) 308-6133**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Michael Razavi**, can be reached at **(703) 305-4713**.

Any response to this action should be mailed to:

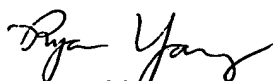
Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 305-47000377.


Ryan Yang
May 24, 2004